REMARKS

In the Final Office Action mailed December 30, 2005, claims 1-66 were rejected. Claims 1-2, 4-28, 30-35, 37-61 and 63-66 were rejected under 35 U.S.C. §102(b) as being anticipated by Cusumano et al. (U.S. Pat. No. 6,567,752). Claims 3, 29, 36 and 62 were rejected under 35 U.S.C. §103(a) as being obvious over Cusumano et al. in view of Discoenzo (U.S. Pat. No. 6,847,854). In the Advisory Action mailed August 9, 2006, the Amendment filed April 28, 2006 was entered but the rejections of the Final Office Action maintained.

Applicant at this time declines to make any claim amendments, but instead offers the following remarks, which clarify how the pending claims patentably distinguish the present invention over the prior art of record.

Interview

A telephonic interview between Examiner Bhat and Austen Zuege, for Applicants, was conducted on September 19, 2006 to discuss the procedural status of the application. Mr. Zuege indicated that a petition to revive would be filed along with a Request for Continued Examination (RCE). Examiner Bhat indicated that a request for interview should be submitted along with the RCE, and such a request for a telephonic interview is included herewith.

Claim Rejections - 35 U.S.C. §102(b)

Claims 1-2, 4-28, 30-35, 37-61 and 63-66 were rejected under 35 U.S.C. §102(b) as being anticipated by Cusumano et al. (U.S. Pat. No. 6,567,752). As explained below, Cusumano et al. fails to anticipate the particular structures and steps for measuring and transmitting data required by both of the pending independent claims.

Independent claim 1 relates to a system for monitoring rotating machinery, and requires a plurality of proximeters positioned proximate to the rotating machinery and each being operable to measure and transmit resonant vibration frequency and amplitude data derived from a transit time between individual rotating extensions of the rotating machinery, along with signal amplitude data. Independent claim 34

relates to a method for monitoring rotating machinery, and requires positioning a plurality of proximeters proximate to the rotating machinery, where the proximeters are each operable to measure and transmit resonant vibration and amplitude data derived from a transit time between individual rotating extensions of the rotating machinery, along with signal amplitude data.

It is important to note that both independent claims 1 and 34 require proximeters that are each operable to measure and transmit two types of data: (1) resonance data derived as a function of a transit time between individual rotating extensions of the rotating machinery and (2) signal amplitude data. Those skilled in the art would recognize that the language of the claims establishes two separate and distinct requirements of the proximeters. The first, resonant vibration data, is derived from transit time data. (P. 7, ¶28). Resonant vibration data relates to vibration characteristics of a particular rotating machinery part, such as resonant vibration frequency and amplitude data for the part. (Id.). The second, signal amplitude data, is derived from signal strength. (P. 8, ¶29). Signal amplitude data permits assessment of parameters such as the relative spacing between components of the rotating machinery. (Id.). Signal amplitude data is not the same as resonant vibration data. This distinction is clarified by an example involving testing of a toothed gear: "In contrast to the circumferential measurements made in the time domain to determine resonant vibration frequency and bending amplitude, a measurement for the distance between the gear and the housing is a function of signal strength. More particularly, the change in signal amplitude, typically measured in millivolts, corresponds to the radial gap between a gear tooth and the housing." (P. 8, ¶29). As required by independent claims 1 and 34, the proximeters must be operable to measure and transmit both (1) resonance data derived as a function of a transit time between individual rotating extensions of the rotating machinery and (2) signal amplitude data.

Cusumano et al. discloses a method and apparatus for tracking the evolution of hidden damage or otherwise unwanted changes in machinery components and predicting remaining useful life. According to Cusumano et al., "fast" subsystem data is gathered to predict "slow" subsystem data, which allows monitoring of slow-to-develop damage. (Cusumano et al., col. 1, ll. 12-17; col. 4, ll. 6-26). In

FIG. 2 of Cusumano et al., a test system 200 and a cantilevered beam 205 are shown, with the beam 205 attached to a strain gauge 220 and a shaker 225 of the system 200. (Cusumano et al., col. 11, ll. 22-36; FIG. 2). The test system 200 is not rotational machinery, but rather is a apparatus for performing bench tests on the beam 205, which is placed in a cantilevered arrangement, using a conventional strain gauge 220 fixed to one end thereof. (Id.).

In order to reject a claim under 35 U.S.C. § 102, each and every element as set forth in the claim must be found, either expressly or inherently described, in the prior art. *See* M.P.E.P. 2131, citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). Furthermore, the identical invention must be shown in a reference in as complete detail as is contained in the claim. M.P.E.P. 2131, citing *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989).

Here, Cusumano et al. fails to show, teach or disclose each and every element of independent claims 1 and 34 because Cusumano et al. fails to disclose a plurality of proximeters that are operable to measure and transmit both (1) resonance data derived as a function of a transit time between individual rotating extensions of rotating machinery and (2) signal amplitude data. The December 30, 2005 Office Action states that at column 12, lines 57-62 Cusumano et al. discloses a plurality of proximeters, and argues that Cusumano et al. teaches "obtaining frequency data over time" and "collects raw data (col. 12, lines 62-67), which would include any data pertinent to the operation of the machinery." (12/30/2005 Office Action, pp. 2 and 9). However, Cusumano et al. fails to show, teach or disclose a plurality of proximeters that are each capable of measuring and transmitting the two types of data required by independent claims 1 and 34. Therefore, the cited passage in Cusumano et al. fails to show an identical invention in as complete detail as is contained in the pending claims.

For instance, FIG. 2 of Cusumano et al. shows only a single data collection element, which is shown as a single strain gauge 205. Those skilled in the art would recognize that strain gauges are distinguishable from proximeters. (See, pp. 6-7, ¶¶ 24-25). Strain gauges measure only deformation, while

proximeters are capable of measuring resonant vibration frequency and bending amplitude. Although Cusumano et al. discloses that "data collection 10 may include a variety of sensors, meters and other data collection instruments," (Cusumano et al., col. 12, ll. 59-62), that disclosure was in reference to a high level block diagram and fails to disclose the use of a plurality of proximeters working together. The reference in Cusumano et al. to a "variety" of sensors does not disclose a plurality of proximeters used together, and therefore the disclosure in the prior art lacks the specificity of the present claims as required to sustain a rejection under §102. M.P.E.P. 2131, citing *Richardson*, 868 F.2d at 1236.

Moreover, Cusumano et al. does not disclose or suggest any apparatus or method for measuring and transmitting the two distinct types of data required by independent claims 1 and 34: (1) resonance data derived as a function of a transit time between individual rotating extensions of rotating machinery and (2) signal amplitude data. Amplitude as it relates to *resonance data*, is not the same as *signal* amplitude data. The Advisory Action cites a passage of Cusumano et al. explaining the filtering of sensed vibration frequencies as disclosing the detection of two types of data. (citing Cusumano et al., col. 12, ll. 62-63). However, the filtering of data so as to focus on a particular range of data does not involve the detection of different types of data, but at most the analysis of two different ranges of the same type of data. In addition, the statement in the Final Office Action that Cusumano et al. "would include any data pertinent to the operation of the machinery" is an expansion on the disclosure of Cusumano et al. that improperly supplies the missing limitations of independent claims 1 and 34. Furthermore, there is no motivation to modify the disclosure of Cusumano et al. Absent the teachings of the present invention, the prior art fails to show, teach, disclose, or suggest each and every element of independent claims 1 and 34.

Thus, independent claims 1 and 34 are allowable over the cited art, and the rejections under §102(b) should be withdrawn. Notification to that effect is requested.

Claims 2, 4-28 and 30-33 depend from independent claim 1 and include all of the limitations of that base claim, and claims 35, 37-61 and 63-66 depend from independent claim 34 and include all of the limitations of that base claim. For the reasons detailed above with respect to independent

claims 1 and 34, all of the dependent claims 2, 4-28, 30-33, 35, 37-61 and 63-66 are also allowable over the cited art, and the rejections under §102(b) should likewise be withdrawn.

In addition, Cusumano et al. fails to show, teach or disclose many limitations recited in the pending dependent claims. The following are some examples.

Regarding dependent claims 4 and 37, the term "runout" (i.e., radial runout) refers to a measure of how a rotating shaft deviates from being truly round. (*See, e.g.*, Sarr, U.S. Pat. No. 7,026,637, col. 1, ll. 11-14). The December 30, 2005 Office Action rejected claims 4 and 37 citing a passage in Cusumano et al. that discusses crack growth in a shaft. (12/30/2005 Office Action, p. 3, citing Cusumano et al., col. 4, ll. 35-42). Crack growth monitoring is unrelated to runout data. Cusumano et al. therefore fails to show, teach or disclose resonant vibration data that includes radial runout data for a shaft having circumferentially disposed extensions, where the resonant vibration data is derived from transit times between individual rotating extensions. Thus, the rejections of dependent claims 4 and 37 should be withdrawn. Likewise, Cusumano et al. fails to show, teach or disclose runout data as required by dependent claims 5, 6, 38, 39 and 41.

Regarding dependent claims 7, 9 and 40, Cusumano et al. does not disclose measurement, transmittal or correlation involving axial movement data, which is like axial runout. Contrary to the assertions in the December 30, 2005 Final Office Action, Cusumano et al. does not show, teach or disclose those claim limitations. The passages of Cusumano et al. cited in the Final Office Action fail to disclose any data relating to axial movement. (12/30/2005 Office Action, p. 3, citing Cusumano et al., col. 4, ll. 31-42 and col. 12, ll. 58-65). Thus, the rejections should be withdrawn.

Regarding dependent claims 10-13, 19, 43-46 and 52, Cusumano et al. does not show, teach or disclose the particular types of electromagnetic, capacitive and optical proximeters required by those various claims. For instance, FIG. 2 of Cusumano et al. discloses only a single strain gauge 220, which is a type of sensor that persons skilled in the art would understand is distinguishable from a proximeter. (Pp. 6-7, ¶¶ 24-25). Moreover, the Office Action cited column 3, lines 30-31 of Cusumano

et al. as disclosing capacitive proximeters. (12/30/2005 Office Action, p. 3). However that passage from Cusumano et al. does not disclose the use of any type of proximeter, but rather discusses *the application of a test method to* "failing or degrading discrete components such as resistor or capacitors." (Cusumano et al., col. 3, ll. 25-32). The cited passage refers to the equipment being tested rather than the equipment used to perform the testing. Thus, the rejections should be withdrawn.

Regarding dependent claims 14, 17-18, 20, 33, 47, 50-51, 53 and 66, Cusumano et al. does not show, teach or disclose the particular locations of proximeters in relation to each other or rotating machnery required by those various claims. Furthermore, as discussed above, Cusumano et al. does not disclose proximeters at all. Thus, the rejections should be withdrawn.

Regarding dependent claims 32 and 65, Cusumano et al. does not disclose assessment of lubricity degradation based upon machinery chatter. The time-to-failure measurement disclosed by Cusumano and cited in the December 30, 2005 Office Action fails to show, teach or disclose the lubricity assessment required by dependent claims 32 and 65. (12/30.2005 Office Action p. 6 citing Cusumano et al., col. 13, ll. 35-38). Thus, the rejections should be withdrawn.

Claim Rejections - 35 U.S.C. §103(a)

Claims 3, 29, 36 and 62 were rejected under 35 U.S.C. §103(a) as being obvious over Cusumano et al. (U.S. Pat. No. 6,567,752) in view of Discoenzo (U.S. Pat. No. 6,847,854).

Claims 3 and 29 depend from independent claim 1 and include all of the limitations of that base claim, and claims 36 and 62 depend from independent claim 34 and include all of the limitations of that base claim. As discussed above with respect to the rejections under §102(b), independent claims 1 and 34 are patentable over Cusumano et al. Discoenzo does not supply the teaching lacking in Cusumano et al. Accordingly, dependent claims 3, 29, 36 and 62 are also patentable over the cited art. The rejections under §103(a) should be withdrawn. Notification to that effect is requested.

CONCLUSION

The Commissioner is authorized to charge any additional fees associated with this paper or credit any overpayment to Deposit Account No. 11-0982.

Respectfully submitted,

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